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Reasons for prolonged hospital stay and clinical management in our surgical oncology clinic

Factors affecting prolonged hospital stay in surgical oncology

Salim İlksen Başçeken, Ferit Aydın, Salim Demirci
Department of Surgical Oncology, Faculty of Medicine, Ankara University, Ankara, Turkey

Abstract

Aim: From a healthcare provider's perspective, the optimal hospital stay is the minimum length of time required to safely discharge the patient home. Length of stay (LOS) is a surrogate indicator of a patient's recovery. In this study, in light of the current literature, the causes of postoperative LOS in patients operated on for gastrointestinal malignancy in a surgical oncology clinic were discussed.

Material and Methods: This retrospective study includes data on baseline demographic characteristics, surgical characteristics, inflammatory markers, and perioperative characteristics of 383 consecutive patients hospitalized for more than 7 days at our surgical oncology clinic between January 2018 and May 2021. Categorical variables were analyzed with the Pearson chi-square test or Fisher's exact test, and continuous variables were analyzed with the Mann-Whitney U test and Kruskal-Wallis test. Results were considered statistically significant at P<0.05.

Results: The patients consisted of 136 (35.5%) females and 247 (65.5%) males. The mean age was 60.9 ± 12.9 years. Complications were observed in approximately half of the patients (48.5%). Complications (p=0.00), re-intervention (p=0.008), diagnosis (p=0.00), and ICU admission (p=0.018) were significantly different from prolonged postoperative LOS in statistical analysis. We found that prolonged postoperative LOS was associated with a high CRP/ALB ratio (p=0.01) and procalcitonin levels (p=0.001). Readmitted patients mostly had increased ICU admission (p=0.018) and prolonged LOS (p=0.000).

Discussion: We believe that strict follow-up of patients with inflammatory markers to minimize postoperative complications will reduce prolonged postoperative LOS and result in reproducible improvement.

Keywords

Complication, Length of stay, Patient Readmission, Surgical Oncology

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Corresponding Author: Salim İlksen Başçeken, Department of Surgical Oncology, Faculty of Medicine, Ankara University, Tıp fakültesi Cd., No:1-4, 06620, Mamak, Ankara, Turkey.
E-mail: salimilksen@gmail.com P: +90 0506 277 68 21
Corresponding Author ORCID ID: https://orcid.org/0000-0002-0918-3208

Introduction

Reduction in length of stay (LOS) is now accepted as a measure of the quality of care. Thus, it has been the subject of numerous studies. However, the trend towards short LOS has also influenced medical and surgical practice and raised concerns about adverse outcomes [1]. For many reasons, the hospital stay of cancer patients is prolonged after surgery, and this is one of the most important reasons for the inefficient use of intensive care and hospital resources. Enhanced recovery programs have been implemented to reduce morbidity, costs, and LOS after cancer surgery. Adherence to enhanced recovery pathways (ERP) allows for the standardization of healthcare processes, resulting in reproducible improvements in the quality of care. These programs have been reported to significantly reduce 30-day morbidity and a 2.5-day length of stay [2,3]. At the same time, the success of these programs delivered in specialized centers has sparked the interest of the surgical community in early discharge programs [3,4]. The improved recovery pathway may allow for more rapid recovery when comorbidities are present. Thus, these programs optimize healthcare resources speeding up recovery and safely reducing length of hospital stay [2].

The causes of prolonged LOS after cancer surgery are multifactorial. Postoperative complications (POC) are a widely recognized predictor of prolonged postoperative LOS. Early detection of POC is associated with a shorter LOS after cancer surgery. Thanks to improved care and increasing pressure from payers, LOS is declining. Clinicians must identify and give special attention to patients requiring a long hospital stay. In this way, hospital resources can be used more effectively.

This study aimed to discuss the causes of prolonged postoperative LOS in patients operated on for gastrointestinal malignancy in our hospital and the clinicopathologic features that influence it in light of the current literature.

Material and Methods

Study Design and Patient Selection

This retrospective study was conducted at Cebeci Hospital, Ankara University. After approval by the Ethics Committee of the hospital (02/07/2021, Protocol No: I5-351-21), medical data were collected using the electronic medical database and medical records of 422 consecutive patients hospitalized for more than 7 days in our Surgical Oncology Clinic between January 2018 and May 2021. Patients who had not undergone surgery, underwent emergency surgery, were readmitted, could not be followed up, and for whom sufficient data were not available were excluded from the study.

Data Collection

Medical records were analyzed to obtain the following data: a) baseline demographic data: Age, sex, American Society of Anesthesiologists (ASA), health status, comorbidity, body mass index (BMI), b) preoperative tumor characteristics: Histopathology, location, T stage c) preoperative laboratory tests: tumor marker 19-9 (CA 19-9), including carbohydrate antigen, carcinoembryonic antigen (CEA), d) postoperative inflammatory markers at 7: procalcitonin, CRP, albumin e) perioperative characteristics: Duration of surgery, type of surgical resection, blood loss, blood transfusion, intensive care unit (ICU) admission, hospital discharge time, POC. According to the modified Clavien classification system for POC, they were classified into low-grade complications (grades 1-2) and high-grade complications (grades 3-4). Causes of POC included fistulae, delayed gastric emptying, bleeding, wound infection, intra-abdominal abscess, ileus and subileus, and anastomotic leakage. Patients were grouped based on their PCT levels of 2 ng/ml.

Statistical Analysis

The SPSS program (version 21.0; IBM SPSS Inc, Chicago, IL) was used for statistical analysis. Descriptive statistics (mean±standard deviation) were used for continuous variables, and frequency and percentage (n,%) were used for categorical variables. The conformity of variables to normal distribution was examined with visual (histogram) and analytical methods (Kolmogorov-Smirnov / Shapiro-Wilk). Differences in the distributions for categorical variables were analyzed using Pearson's chi-squared (x2) and Fisher's exact tests. Abnormal distributions for continuous variables were analyzed using the Mann-Whitney U test and the Kruskal-Wallis test. The statistical significance value accepted was $p<0.05$.

Results

A total of 422 patients were included in the study. Thirty-nine patients were excluded from the study and follow-up due to insufficient data. Of the remaining 383 patients, 136 (35.5%) were females, and 247 (65.5%) were males. The mean age was 60.9 ± 12.9 years. The mean BMI was 23.7 ± 4.8 kg/m2 . Preoperative diagnostic tests revealed carcinoma in 383 patients. Perioperative blood transfusion was required in 64 (16.7%) of the patients. The mean blood loss during surgery was 205 ± 32 ml. The mean operation time was 195±41.5 minutes.

Table 1. Baseline Demographic and Operative Characteristics

Variables	N=383	P value
Age (years)	60.9±12.9	0.57
ASA physical status I/II/III/IV	69/168/84/62	0.69
Comorbidity (n,%)	164(42.8)	0.53
T stage I/II/III/IV	35/50/227/71	0.37
Type of operation open/laparoscopic	279/104	0.47
Complication (n,%)	186(48.5)	0.000
Re-interventions (n,%)	143(37.3)	0.008
Diagnosis (n,%)		
Gastric neoplasm	170(44.4)	0.87
Pancreatic neoplasm	108(28.2)	0.12
Colonic neoplasm	17(4.4)	0.96
Rectal cancer	53(13.8)	0.32
Esophageal cancer	35(9.1)	0.001
CEA ng/ml	20.4±75.8	0.67
CA19.9 ng/ml	269.7±2120	0.53
CRP/ALB ratio Postoperative 7th Day	3.8±1.4	0.01
Procalcitonin Postoperative 7th Day (≥2 ng/m)	321(83.8%)	0.001
ICU admission (n,%)	89(23.2)	0.018
Length of hospital stay (day)	13.8±10.3	
Readmission (n,%)	71(18.5)	0.000

ASA: American Society of Anesthesiologists, ICU: intensive care unit

Table 2. Distribution of Variables by Diagnosis

Variables	Gastric neoplasm	Pancreatic neoplasm	Colonic neoplasm	Rectal cancer	Esophageal cancer
	N=170	N=108	N=17	N=53	N=35
LOS (day)	13.7±9.2	12.6±12.1	9.4±2.3	13±9.7	21.5±7.8
Complication (n, %)	93(50.0)	28(15.1)	11(5.9)	36(19.4)	18(9.7)
Re-interventions (n,%)	53(37.1)	38(26.6)	1(0.7)	26(18.2)	25(17.5)
Readmission (n,%)	39(54.9)	10(14.1)	0(0.0)	4(5.6)	18(25.4)

LOS: Length of hospital stay

POC of varying degrees was detected in 186 (48.5%) patients, 79 (42.5%) of the observed complications were low-grade complications, and 107 (57.5%) were high-grade complications. Demographic and operative characteristics are shown in Table 1.

In the statistical analyses performed, POC (p=0.00), re-intervention (p=0.008), diagnosis (p=0.00), and ICU admission (p=0.018) were significantly different from prolonged postoperative LOS. It was found that this differentiation reached statistical significance in patients with esophageal cancer in the subgroup analyses performed for diagnosis (p=0.001).

Postoperative inflammatory markers CRP/ALB ratio (p=0.01) and procalcitonin level (p=0.001) were also associated with prolonged postoperative LOS.

Most readmitted patients had increased ICU admission (p=0.018) and prolonged LOS (p=0.000)(Table 1).

Although 54.9% of readmitted patients had gastric cancer, half (51.4%) of patients with esophageal cancer were readmitted for any reason (Table 2).

Discussion

In different series, the median LOS after GIS surgical procedures is 13-18 days. Severe complications are important in increased postoperative mortality and prolonged postoperative LOS, especially when they require reoperation [5]. The mean LOS in this study was approximately 14 days. The mean LOS for patients with esophageal cancer was about 22 days in our series. However, except for colon cancer, the mean LOS for other cancer types of GIS was approximately the same.

In general, complications double the LOS. The authors calculated that the association of a surgical complication with a patient's length of stay could be numerically related. The rate of infectious complications corresponds to the clinical severity of the complication [6], and it is also widely recognized as an important determinant of length of stay [7]. The strongest independent predictors of prolonged LOS in colorectal surgery are postoperative re-intervention, surgical site infection, open surgery, and distant metastases [8]. In addition, advanced age and transition to open surgery are associated with prolonged LOS in these patients [9]. In addition to abdominal infectious complications in gastric cancer patients, age, surgical procedure, extent of resection, degree of incision healing, and perioperative blood transfusions are independent risk factors for long-term postoperative LOS [10]. Similarly, complications after pancreatic resection, especially postoperative infections, are independent risk factors and have been reported to be associated with an increased risk of readmission , [5,11,12].

In our study, increased complication, re-interventions and ICU admission rates were mostly associated with prolonged postoperative length of stay, consistent with the literature. Seventy-nine (42.5%) of the observed complications were low-grade complications, and 107 (57.5%) were high-grade complications. The most frequent re-interventions were observed in patients operated on for esophageal cancer (71%). Appropriate measures to minimize postoperative complications reduce the prolonged length of stay and postoperative readmissions [13]. Some of the strongest independent predictors of long-term LOS, such as surgical infections or open surgery, can be changed to reduce LOS and, thus, other adverse outcomes [8]. For this reason, inflammatory markers such as procalcitonin, CRP, and albumin are frequently used for follow-up in our clinic to predict postoperative complications. Procalcitonin can be used as a biochemical parameter concerning abdominal infections and anastomotic leaks. It is recommended to monitor the value, especially on postoperative day five, and to investigate whether anastomotic leakage occurs when the value reaches the highest level [14]. Moreover, high postoperative values in gastric cancer and other malignant patients are also significant for mortality and survival at follow-up, [15]. Similarly, the postoperative CRP / ALB ratio and CRP levels were independent predictors of serious complications after gastrectomy for gastric cancer [16].

Similarly, this study found that an elevated CRP/ALB ratio and elevated procalcitonin levels, used as inflammatory markers in postoperative follow-up, are associated with longer postoperative LOS. In addition, patients with the possibility of having a stoma opened in our hospital are counseled by the preoperative stoma nurse. The stoma site is marked if needed in the postoperative period. Nursing instructions and patient education are provided [17].

Patient and health-related factors are associated with long-term LOS after GIS procedures. Longer LOS affects health care costs by increasing the risk of emergencies and readmissions [18]. Our study found high 30-day readmission rates after discharge in patients with long LOS and patients admitted to the ICU.

Readmissions are a problem for all healthcare providers, including comprehensive cancer centers. Current health policies aim to reduce preventable admissions. Early readmission is an unpredictable continuation of GIS procedures that is not associated with shorter LOS [19]. However, hospital

readmissions after GIS surgery have also been reported to be reduced by extending discharge by 1 day with the same discharge criteria [1].

Reasons for readmission after general surgery are multifactorial. However, the common denominator of our data and other studies in the literature is postoperative complications [3,13,20-22]. Retransmissions have been associated with poorer survival, so efforts to reduce retransmissions are likely to improve patient outcomes [23].

Conclusion

Recently, efforts to reduce long-term hospitalization have been an important component of healthcare policy. The most important reason for this is the simultaneous achievement of important goals, such as reducing healthcare expenditures and increasing the quality and efficiency of care through fewer hospitalizations. Despite all their negative effects, it is impossible to avoid long-term hospitalization completely. However, such an approach is also logically flawed. For policies to reduce long-term hospitalizations to be successful, the underlying factors must first be identified. Therefore, more comprehensive and multicenter prospective studies are needed to assess the causes and predisposing factors for long LOS and to identify high-risk patients.

Study Limitations

Our study has limitations as it is retrospective and single-center. Only patients who had surgery were included in the study. Those who received conservative treatment were excluded from the study.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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